

REMARKS

The amendment to the claims is submitted herewith in a form in accordance with proposed rule changes which are promulgated by the Patent and Trademark Office, which new rules are expected to become mandatory in July, 2003.

The last Office Action and the references cited by the Examiner have been carefully considered. The claims have been amended in a sincere effort to define more clearly and more specifically features of Applicant's invention which distinguish over the art of record.

Claims 1-4 have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-5 of U.S. Patent No. 6,180,962 in view of U.S. Patent No. 6,228,676 (Glenn, et al.).

Submitted herewith is a Terminal Disclaimer executed on behalf of the Applicant in which the term portion of any patent issuing from the subject application will not extend beyond the term of the aforementioned U.S. Patent No. 6,180, 962.

It is respectfully urged that the Terminal Disclaimer is in proper form and obviates the double patenting rejection of Claims 1-4.

Claims 1-4 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,227,662 (Ohno, et al.) in view of U.S. Patent No. 5,936,264 (Ishinaga).

Specifically with respect to Claim 1, the Examiner contends that the Ohno, et al. patent discloses a composite lead frame and semiconductor device and specifically refers to Figure 7 of the Ohno, et al. patent for disclosing the structure set forth in Claim 1. More specifically, the Examiner contends that Figure 7 of the Ohno et al. patent shows a pair of electrodes having an inner portion 12 and an outer portion 10, wherein the inner portion resides in the same plane as the outer portion. The Examiner further contends that the Ohno,

et al. patent discloses a mold 38 encapsulating the chip 34 and the mold 38 encapsulating the inner portion of the electrode 12 and the outer portion 10 extending substantially laterally beyond the mold 38, again referring to Figure 7 of the Ohno, et al. patent.

The Examiner further contends that a "step 28 [is] formed in the inner portion 12 of the electrode inside the mold 38", and refers again to Figure 7 of the Ohno, et al. patent. The Examiner acknowledges that the Ohno, et al. patent does not disclose that the integrated circuit chip is a light-emitting chip. However, he contends that it is common in the art to encapsulate a light-emitting chip with this method such as disclosed in Figure 1 of the cited Ishinaga patent. He concludes, therefore, that it would have been obvious that the integrated circuit chip could be a light-emitting chip.

The rejection of Claim 1 in view of the combination of the Ohno, et al. patent and the Ishinaga patent is respectfully traversed. This appears to be a situation where the teachings of Applicant's own disclosure is being used, in hindsight, to reconstruct the invention from various references, and the references are being applied in a manner which effectively misinterprets the structure and purpose of the devices disclosed in the references. As will be discussed in greater detail, the Ohno, et al. patent does not teach or suggest the specific structure of the step formed in the inner portion of the electrodes. Neither is such a step disclosed in the Ishinaga patent. The closest reference cited by the Examiner is U.S. Patent No. 6,180,962, which was applied in an obviousness-type double patenting rejection. This rejection is respectfully submitted to have been overcome by the Terminal Disclaimer submitted herewith.

The Examiner equates Applicant's inner portion of the electrode 14, 16 with portion 12 of lead frame 10 of the composite lead frame and semiconductor device disclosed in the

Ohno, et al. patent. He then equates the step 18 formed in the inner portion of the electrode 14, 16 of Applicant's device with the lead wire 28 of the composite lead frame of the Ohno, et al. device.

First, the lead wire 28 is not a step, nor does it function as a step. Figure 7 is a cross-sectional view, but if one looks at Figures 1C, 1D, 1E, 3B, 3C and 3D of the Ohno, et al. patent, and the description relating to these figures found in the specification of the Ohno, et al. patent, including Column 3, lines 37-41 of the Ohno, et al. patent, it is clear that reference numeral 28 refers to the plurality of lead wires, not steps. Furthermore, as clearly shown in each of the above-mentioned figures, the lead wires 28 could not possibly function as steps, because they extend not across the outwardly extending portions of lead frame 10, but rather parallel to them. This is clearly shown in the superimposed drawing of the plastic film 22 and the lead frame 10 shown in Figures 1E and 3D of the Ohno, et al. patent. The lead wires 28 are not formed as steps in the inner portion of the electrodes, nor do they function as the step 18 in Applicant's electrodes to block solder 40 from advancing, as taught by Applicant. Reference numeral 28 refers merely to the lead wires. There is no disclosure in the Ohno, et al. patent that lead wires 28 function as steps to prevent the flow of solder from advancing, and furthermore, it is impossible for the lead wires 28 to perform this function. This is because they were never intended to perform this function, as is clear from the specification and drawings of the Ohno, et al. patent. Their parallel orientation to the lead frame portions clearly supports this interpretation.

Additionally, the Examiner states that the inner portion 12 of the electrode (i.e., lead frame 10) includes step 28 which, in reality, is lead wire 28. In the Ohno, et al. patent, lead wires 28 do not form part of the lead frame 10 or the inner lead portion 12; they are separate

components. Claim 1 specifically states that the step is "formed in said inner portion". This limitation is not met by the Ohno, et al. patent alone or in combination with the Ishinaga patent.

Furthermore, lead wire 28 could not possible function as a step to prevent the flow of solder from advancing, because it is positioned over plastic film 22'. If lead wire 28 were "formed in said inner portion" of the electrode, as set forth in Claim 1, then the plastic film portion 22' must be part of the lead wire 28 and the inner lead portion 12, using the Examiner's analogy. This could not be the case, because the plastic film portion 22' is non-conductive and could not function as a portion of the inner portion of the electrode in which the step is formed, and the plastic portion would melt and deform, with the lead wire 28 either collapsing or separating from the electrode if its purpose were to block the advance of solder. This is respectfully urged to be a situation where the cross-sectional view shown in Figure 7 must be viewed in context with the specification and the other figures of the Ohno, et al. patent.

To further ensure that there is no possible confusion between Applicant's claimed invention and the composite lead frame and semiconductor device disclosed in the Ohno, et al. patent, and to, hopefully, satisfy the Examiner's concerns if he believes there is such confusion, Claim 1 has again been amended to more specifically define that the step is "formed by only a metal layer in said inner portion". As specifically stated in the specification, each of the electrodes 14 and 16 comprise 3 layers, i.e., a Cu layer, an Ni layer and an Au layer, as shown in Figure 1C, and the step 18 is formed by providing the Cu-layer with a greater thickness at the inner portion (substrate center side) and a smaller thickness at the outer portion (terminal side), as set forth at Page 4, lines 8-11 of the specification. The

step 18 does not rest on, nor is it formed from, any plastic film; it is formed only by a metal layer. The heat of the melting solder will thus not deform the step 18.

It is respectfully urged that this additional limitation further distinguishes Applicant's claimed invention from the composite lead frame and semiconductor device of the Ohno, et al. patent. Accordingly, it is respectfully urged that Claim 1, as now further amended, patentably distinguishes over the Ohno, et al. patent, alone or in combination with the Ishinaga patent, and is allowable.

With respect to Claim 2, the Examiner contends that the Ohno, et al. patent discloses that the electrode includes a copper layer, and the step is formed by changing the thickness of the copper layer. Claim 2 depends from Claim 1 and patentably distinguishes over the Ohno, et al. patent and the Ishinaga patent for the same reasons submitted with respect to Claim 1. Furthermore, there is no "step" in the Ohno, et al. patent, and the lead wire 28 is not "formed in said inner portion" of the electrode, as specifically set forth in amended Claim 1.

Furthermore, at Column 7, lines 5-6 of the Ohno, et al. patent, a copper layer is not disclosed, but rather a copper sheet pattern which is the wiring pattern. Thus, the lead wire 28 (which the Examiner equates to Applicant's step 18 formed as part of the electrode) is not formed by changing the thickness of the electrode (i.e., the Ohno et al. lead frame 10). This is clearly shown in Figures 1A-1E of the Ohno, et al. patent, and especially in Figure 1E, where the plastic film 22 carrying the plurality of lead wires 28 is superimposed on the lead frame 10. These are two separate subassemblies in the formation of the composite lead frame and semiconductor device of the Ohno, et al. patent.

Accordingly, for these reasons and the reasons submitted with respect to amended Claim 1, it is respectfully urged that Claim 2 patentably distinguishes over the Ohno, et al. patent and the Ishinaga patent, alone or in combination.

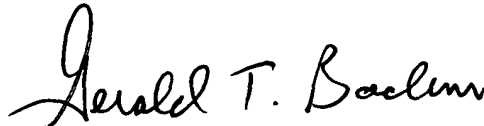
Claims 3 and 4 respectively depend from Claims 1 and 2, and are urged to patentably distinguish over the references of record for the same reasons submitted with respect to Claims 1 and 2.

Accordingly, it is respectfully urged that Claims 1-4 patentably distinguish over the references of record and are allowable.

A Petition for a One-Month Extension of Time is submitted herewith, along with a Terminal Disclaimer.

In view of the foregoing amendments and remarks, entry and favorable consideration of the amendments to Claim 1, reconsideration of Claims 2-4 and allowance of the application with Claims 1-4 are respectfully solicited.

Respectfully submitted,



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